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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

T. MIYAMOTO et al

Serial No. 09/499,618

Group Art Unit: 2814

Filed: February 7, 2000

Examiner: A. Chambliss

For: MEMORY-MODULE AND A METHOD OF MANUFACTURING THE SAME

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

November 13, 2001

Sir:

Further to the Response to Restriction Requirement filed October 26, 2001 and before examination on the merits, please amend the above application as set forth below.

IN THE CLAIMS

Cancel claims 14-19, without prejudice, and add new claims 25-35, as follows:

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25. (New) A memory module according to claim 24, wherein an insulating layer comprising the rewirings is thicker than an inorganic insulating protection film formed over the main surface of the semiconductor chip of the protruded terminal semiconductor devices.

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26. (New) A memory module according to claim 25, wherein the insulating layer of the rewirings is comprised of polyimide.

27. (New) A memory module according to claim 2, wherein an insulating layer comprising the rewirings is thicker than an inorganic insulating protection film formed over each of the areas of the semiconductor chips of the protruded terminal semiconductor devices.

28. (New) A memory-module comprising:
first semiconductor devices having protruded terminals formed in the areas of semiconductor chips as external terminals, mounted via the protruded terminals;
a second semiconductor device having outer leads as external terminals, and mounted via the outer leads that are electrically connected to the bonding electrodes of the semiconductor chip; and
a module board supporting the first semiconductor devices and the second semiconductor device;

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Contd.*

wherein the first semiconductor devices and the second semiconductor device are mounted in a mixed manner on the module board; and

wherein DRAMs are mounted as the first semiconductor devices, and an EEPROM is mounted as the second semiconductor device.

29. (New) A memory-module comprising:

first semiconductor devices having protruded terminals formed in the areas of semiconductor chips as external terminals, mounted via the protruded terminals;

a second semiconductor device having outer leads as external terminals, and mounted via the outer leads that are electrically connected to the bonding electrodes of the semiconductor chip; and

a module board supporting the first semiconductor devices and the second semiconductor device;

wherein the first semiconductor devices and the second semiconductor device are mounted in a mixed manner on the module board; and

wherein DRAMs are mounted as the first semiconductor devices, and a register is mounted as the second semiconductor device.

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30. (New) A memory-module comprising:
a board and a plurality of semiconductor devices mounted
thereon, the semiconductor devices including first
semiconductor devices and a second semiconductor device which
are mounted thereon in a mixed manner;

the first semiconductor devices including a semiconductor
chip and a plurality of protruded terminals formed on a main
surface region of the semiconductor chip, the semiconductor
chip being mounted on the board via the protruded terminals;
and

the second semiconductor device including a semiconductor
chip with a plurality of bonding pads on the main surface
thereof, a plurality of leads each being constituted by an
inner portion and an outer portion, wires for electrically
connecting the bonding pads to the inner portions of the
leads, and a sealing member for sealing the semiconductor
chip, the inner portions and the wires, and the second
semiconductor device being mounted on the board via the outer
portions of the leads protruding beyond the sealing member;

wherein DRAMs are mounted as the first semiconductor
devices, and an EEPROM is mounted as the second semiconductor
device.

Cont'd.

31. (New) A memory-module comprising:

a board and a plurality of semiconductor devices mounted thereon, the semiconductor devices including first semiconductor devices and a second semiconductor device which are mounted thereon in a mixed manner;

the first semiconductor devices including a semiconductor chip and a plurality of protruded terminals formed on a main surface region of the semiconductor chip, the semiconductor chip being mounted on the board via the protruded terminals; and

the second semiconductor device including a semiconductor chip with a plurality of bonding pads on the main surface thereof, a plurality of leads each being constituted by an inner portion and an outer portion, wires for electrically connecting the bonding pads to the inner portions of the leads, and a sealing member for sealing the semiconductor chip, the inner portions and the wires, and the second semiconductor device being mounted on the board via the outer portions of the leads protruding beyond the sealing member;

wherein DRAMs are mounted as the first semiconductor devices, and a register is mounted as the second semiconductor device.

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32. (New) A memory-module according to claim 30, wherein spaces between the first semiconductor devices and the board are filled with resin.

33. (New) A memory-module according to claim 30, wherein a rear surface of the semiconductor chip of the first semiconductor devices is revealed at the upper surface of the first semiconductor devices.

34. (New) A memory-module comprising:
first semiconductor devices having protruded terminals as external terminals, mounted via the protruded terminals, and provided with rewirings which are wiring portions for expanding the pitch among the protruded terminals to be wider than the pitch among the bonding electrodes in the areas of semiconductor chips;

a second semiconductor device having outer leads as external terminals, and mounted via the outer leads that are electrically connected to the bonding electrodes of the semiconductor chips; and

a module board supporting the first semiconductor devices and the second semiconductor device;

wherein the first semiconductor devices and the second semiconductor device are mounted in a mixed manner on the module board; and

wherein DRAMs are mounted as the first semiconductor devices, and an EEPROM is mounted as the second semiconductor device.

35. (New) A memory-module comprising:

a board and a plurality of semiconductor devices mounted thereon, the semiconductor devices including first semiconductor devices and a second semiconductor device which are mounted thereon in a mixed manner;

the first semiconductor devices including a semiconductor chip with a plurality of bonding pads on the main surface thereof, rewirings which are wiring portions for expanding the pitch among the bonding pads to be wider than the pitch among the bonding pads, and a plurality of protruded terminals formed at the ends of the rewirings maintaining a pitch wider than the pitch among the bonding pads on a main surface region of the semiconductor chip, the semiconductor chip being mounted on the board via the protruded terminals; and

the second semiconductor device including a semiconductor chip with a plurality of bonding pads on the main surface

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thereof, a plurality of leads each being constituted by an inner portion and an outer portion, wires for electrically connecting the bonding pads to the inner portions of the leads, and a sealing member for sealing the semiconductor chip, the inner portions and the wires, and the second semiconductor device being mounted on the board via the outer portions of the leads protruding beyond the sealing member; wherein DRAMs are mounted as the first semiconductor devices, and EEPROM is mounted as the second semiconductor device.

REMARKS

The Applicants request entry of the foregoing amendment and new claims 25-35.

Respectfully submitted,


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